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CONTENTS

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EDITORIAL

TUBERCULOSIS AND THE NEGRO

With the observance of the thirty-fourth annual Negro Health Week, April 4 to 11, it is appropriate that we turn our attention to the problem of tuberculosis among Negro citizens of this Nation. Great advances have been made in tuberculosis control among Negroes since the first Negro Health Week in 1914. Tuberculosis control workers as well as the Negro people of this country have reason for pride in past accomplishment and for great expectations of the future, for the trend of tuberculosis mortality in the Negro is indeed heartening.

In 1945, for the first time in history, Negro tuberculosis deaths fell below 100 per 100,000 population, to a new rate of 98.0. This is especially meaningful when we realize that 30 years ago the death rate was perhaps four times as great. Encouraging as this trend is, however, we should be guilty of complacency were we satisfied with present tuberculosis control measures among the Negro people. For it is still true that Negroes, who comprise but 10 percent of the total population, suffer 25 percent of all tuberculosis deaths.

This disproportion is further emphasized by a comparison of Negro and white tuberculosis mortality rates—98.0 for Negroes against 32.7 for white persons. In the 15–44 age group, the Negro tuberculosis mortality rate is about five times that of the white. Among Negroes, too, tuberculosis is in fourth place as a cause of death, preceded only by heart disease, intracranial lesions of vascular origin, and nephritis. When we consider that 13,000 Negroes die of tuberculosis annually, and that we today possess the medical and scientific tools to prevent most tuberculosis deaths, we know that these deaths need not be.

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* This is the twenty-sixth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

It is true that epidemiology has not as yet resolved the perplexing lack of correlation between tuberculosis morbidity and mortality in the Negro. Community radiographic case-finding surveys reveal that the prevalence of the disease among Negroes is essentially the same as among whites. However, when the infection does take hold, it is far more likely to run a rapidly fatal course in the Negro than in the white person. At best, we can conclude that this indicates a lesser degree of tolerance to the ravages of the disease,whatever the cause.

What, then, can be done to control tuberculosis more effectively among Negroes? An elementary principle of disease control is the intensification of control measures in those areas where the hazards are greatest. The course of tuberculosis in the Negro is rapid and deadly. Early case finding is therefore urgent because among Negro victims of tuberculosis the stage of infectiousness is probably reached quite rapidly. Moreover, facilities for isolation and treatment, now grossly inadequate to care for the needs of the Negro population, must be greatly augmented. In addition, we should consider the employment of a resistance-building measure such as BCG, once its value as an immunizing agent has been clearly established.

Tuberculosis control is an indivisible process, and it is axiomatic that improvement in one area contributes materially to total progress. If we can succeed in reducing the Negro death rate to a level equalling white mortality, we shall have improved the national rate by more than 20 percent. The expenditure now of but little additional effort toward the mitigation of tuberculosis among Negroes must therefore result ultimately in a much higher national level of health and vitality.

FRANCIS J. WEBER, *Medical Director,*
Chief, Tuberculosis Control Division.

STUDIES OF PATIENTS DISCHARGED FROM TUBERCULOSIS SANATORIA [1]

I. A Method of Collecting Basic Data From Central Record Systems

By AGNES W. BREWSTER, *Biometrician, United States Public Health Service, and* RALPH CARR FLETCHER, *Associate Professor of Social Work, University of Michigan and Special Consultant, Tuberculosis Control Division, United States Public Health Service.*

Many tuberculosis authorities (*1, 2, 3, 4*) have pointed out the need for studying survivals and readmissions among patients discharged from sanatoria. However, the number of such studies is small in spite of such recommendations as those made by Hilleboe over 10 years ago. He said, "By applying the easily mastered technique of life table analysis to sanatorium follow-up records, and with proper regard for the variables involved, a useful mass of statistics would become available for research in the problems associated with tuberculosis. The application of these methods could be extended to studies of morbidity, the effects of special treatments, socio-economic factors, and a multitude of other fundamental questions concerning tuberculosis which remain largely unanswered."

The greatest single obstacle to a larger volume of research has been the difficulty of following patients after their discharge from sanatoria. After hospitalization, public health officials frequently lose contact with patients so that when follow-up is attempted many must be classified "untraced." The reasons for losing sight of patients are legion. An enumeration of a few shows that patients move from one health jurisdiction to another; female patients marry and change their names; and some patients deliberately disappear because they wish to forget that they ever had tuberculosis.

The difficulties of obtaining data do not end when the whereabouts of the patient have been determined. There are many problems connected with interviewing patients after they are located. Competent interviewers are scarce and because of their specialized training their salaries are frequently beyond the reach of many official agencies. Furthermore, the results of interviewing, even with skilled interviewers, are often inaccurate because of the patient's vague recollections of his experience, or because of erroneous reports from the family of a deceased patient. Earlier studies have relied upon mailing questionnaires to the last-known address and upon follow-up visits by field personnel. Coverage by this expensive technique, however, is frequently incomplete. The number of untraced patients ranges from 10 percent (*2*) to more than 25 percent (*5*) in some of the studies examined.

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[1] From the Office of Field Studies, Tuberculosis Control Division.

During the past 20 years, progress has been made in the keeping of official State records relating to the health and welfare of individuals. These files have been developed for a variety of administrative purposes, including fiscal and control problems. Therefore the question can be raised as to whether it is possible to rely upon available central records to furnish the basis for research about patients discharged from sanatoria. Can as high a coverage be obtained from the central files of a State as that secured by employing the individual follow-up techniques? Are the data obtained from central files as accurate as those obtained by interviewing? Can the files be used for studies repeated at intervals, and will such repeated studies contain comparable data? The present study was undertaken to answer these questions.

This series of papers, the first of which is here presented, attempts to solve the problem of accumulating a sufficient body of data to permit the drawing of sound conclusions about patients discharged from sanatoria. This first paper is devoted to a study of methods of collecting data, and describes a simple and accurate means of obtaining the information required for studies of survival and readmission rates. The second paper will demonstrate how the data can be used for the determination of mortality and survival rates by such factors as age, race, sex, marital status, stage of disease on admission and condition on discharge, manner of discharge, and length of stay. The third, which will deal with readmission rates, is likewise a demonstration of the application to tuberculosis control problems of data covering many more classifications than age, race, and sex. It will be particularly pertinent to considerations involved in planning for the total care of patients, by showing what types of patients fail to secure sufficient benefit from their first period of sanatorium care to preclude further hospitalization. The fourth paper will be devoted to an analysis of the types of patients who leave sanatoria against medical advice, and will examine the effects of this type of discharge upon subsequent survival and readmission. It should be of interest to professional personnel concerned with assisting the patient in obtaining the maximum benefit from his first period of sanatorium care.

DEVELOPMENT OF THE METHOD

The first step in developing the proposed method was the selection of a State record system which met certain predetermined criteria. The system should contain the records of all persons discharged from sanatoria over a period of at least 5 years. In addition, records must include such items as adequate identification of the patient, dates of admission and discharge, and notations that records refer to first admission or readmission. Finally, they should indicate whether the patient was alive or dead upon discharge.

The New Jersey State Department of Institutions and Agencies has maintained centralized files for over 50 years. Since 1928 their record system has met the stated criteria. Furthermore, the Tuberculosis Control Division of the State Department of Health and the Research and Statistical Division of the State Department of Institutions and Agencies were interested in testing the accuracy and utility of their records.

The central file in Trenton contains separate cards (fig. 1), filed alphabetically, for each stay of every patient in any of the 12 county sanatoria, in the State sanatorium, and in some of those privately operated. It contains the same type of card for all admissions to other State institutions and to general hospitals with tuberculosis services.

INSTITUTION: ESSEX COUNTY TUBERCULOSIS SANATORIUM — No. 5293

Last Name: GRAHAM — First Name: DORIS R. — Sex: F

First Admission: X — Readmission: ☐ — Transfer: ☐ — Committed: ☐ — Voluntary: ☐

Last Residence (Outside of an Institution)	County of Legal Settlement	How long in County	Date of Birth	Color	Marital St.
46 PINE STREET, NEWARK, N. J.	ESSEX	6 YRS.	10/20/19	W	Single

Native Born X		Foreign Born			Manner of support: Private ☐ State Indigent ☐ County Indigent X
State	Years in N. J.	Country of Birth	Years in U. S.	Years in N. J.	Name of institution from which admitted:
N. Y.	6 YRS.	U.S.A.			

Name of Father: EDWIN W. GRAHAM — Name of Mother: ROSE H. HELMER

Country of Birth of Father: U.S.A. — Country of Birth of Mother: U.S.A.

Correspondent: MOTHER — Address: SAME

Specific diagnosis on admission: PULMONARY TUBERCULOSIS, FAR ADVANCED AND EMPYEMA

Condition on discharge: Recovered ☐ Improved ☒ Unimproved ☐ w/o Consent
Other condition (specify)

Date of admission	Date of discharge	Date of death	Transfer: date Institution Returned from transfer
3/1/40	11/14/41		

STATE OF NEW JERSEY — DEPARTMENT OF INSTITUTIONS AND AGENCIES — TRENTON — Form 51

FIGURE 1.

For the purposes of this study a follow-up of the patients discharged during a single year seemed sufficient. A list of the names and case numbers of all patients discharged *alive* from July 1, 1941, to June 30, 1942, was prepared, utilizing the monthly discharge lists of the 13 public sanatoria. All records for persons whose names appeared on the list were drawn from the central file, and a complete record of all stays was made. In cases where patients died in sanatoria, in other State institutions or in general hospitals with tuberculosis services, dates of death were also obtained and noted.

The records of the State Bureau of Vital Statistics were searched for death certificates of all persons on the list except those who were known to be in a sanatorium on January 1, 1947, or those whose death had been recorded in the central files. If a death certificate was located,

the date, place, and cause of death were combined with information obtained from the cards in the central file. This search also provided information about deaths which occurred outside the State and which were allocated to New Jersey.

This procedure provided a fairly complete record of the mortality and readmissions to sanatoria of all patients discharged during the base year, 1941–42, from the date of discharge to January 1, 1947. Since the critical period of adjustment of the patient, as reflected in mortality and readmission rates, is within the first few years after discharge, the 5-year span was deemed adequate.

Homogeneity of the group was obtained by selecting only adults with pulmonary tuberculosis. Individuals less than 17 years of age at the time of their admission and those diagnosed as nontuberculous as well as those with a diagnosis of nonpulmonary tuberculosis were excluded. Those who died during their *first* sanatorium stay were also excluded because emphasis was to be placed on the problem of follow-up. This selective process reduced the number of persons on the list to 1678.

The group was further limited to those cases whose *first* period of sanatorium care ended between July 1, 1941, and June 30, 1942. This limitation was made because it was felt that the inclusion of othe patients might introduce bias into the findings. When readmitted, patients are usually in more advanced stages of the disease; they are drawn from groups which might vary greatly in respect to age, race, sex, and stage of disease on admission; some have previously had surgery; and their attitudes toward acceptance of sanatorium treatment have been affected by their previous experience. This restriction eliminated 424 additional names, leaving 1,254 patients in the group.

EVALUATION OF THE METHOD

It was realized that the collected data might contain certain errors due to careless searching, misspelling or misfiling of record cards, and failure to record name changes for females married during the 5-year period studied. In order to estimate the magnitude and to determine the source of these errors a check was made utilizing the records of all female patients. The records of females were selected for this purpose for two reasons: (a) errors resulting from changes in name through marriage could thus be measured; and (b) filing and searching errors discovered among the female group could be considered to apply to all records. The data on the whole group of 1,678 cases were coded as they were collected and were later placed on punch cards so that all tables were prepared by machine sort. The cards included an alphabetical punching of the names of the patients. To prepare lists of female patients who had stayed at each of the sanatoria included in the study and to give the dates of their admissions and discharges, the appropriate cards were machine tabulated.

Each sanatorium was furnished the information previously collected about dates of admission and discharge of all female patients who had stayed at the particular institution during the period under review. The sanatorium was asked to check for accuracy and omissions, and to report all name changes.

The number of errors found in this check of female patients' records was negligible. Records of 742 stays for the 585 females included in the list had been obtained from the central file. Seventeen additional stays were reported by the sanatoria, so that the actual number of stays for the group was 759. Eleven of the stays which were missed in the original search were due to changes of name through marriage; only six could be attributed to failure to locate cards in the central file.

As a result of this check, revisions were made in the original data to correct all the errors discovered in the records of female patients. It is probable that a small error, equivalent to the six missed stays for the females, exists among the male cases; some of these, however, were actually eliminated by a subsequent check.

If records similar to those available in New Jersey are used in future studies, and if the same level of efficiency is maintained in the searching process, such checks as just described would appear to be unnecessary in view of the negligible quantity of clerical errors which could be expected. The precision of future studies will be substantially improved, however, if all marriages of discharged female patients can be recorded and the cards cross-referenced by both maiden and married names. State Central Record Systems if established as outlined in the manual prepared by the Tuberculosis Control Division of the United States Public Health Service (*6*) would provide a consolidated source of all of the information needed to compute survival and readmission tables and considerably simplify the task of collecting the data.

Only 23 of the persons on the original list had been admitted at one time or another to any of the private sanatoria which report to the New Jersey Department of Institutions and Agencies. The number of errors affecting the readmission rates due to failure to note other private sanatorium stays was not determined. With 2,761 public beds and 236 private beds reported in New Jersey in 1940 (*7*), it is obvious that readmissions to private sanatoria would have little effect on the total readmission rates.

The effect on the whole study group of the check may be summarized in the following manner:

Number of persons	Prior to check	After check
With one stay	929	896
With more than one stay	325	352
Total	1,254	1,248

For the purpose of comparing the method of using central files with that employing the interview, as well as to determine the composition of the untraced population, another procedure was undertaken. The comparison was made primarily to determine the errors in enumeration of stays and the errors in recording deaths. A random sample of the white patients was selected by choosing one of every four persons not known to be dead by January 1, 1947. Because of the small size of the nonwhite group, all of them (80 survivors out of 138 discharges) were added to the random sample of the white group, yielding a total of 293 people.

A questionnaire was prepared which was designed to reveal the status of a case as of January 1, 1947 and the patient's complete record of sanatorium care. The New Jersey Department of Health agreed to supervise individual follow-up of these cases, using public health nurses, tuberculosis association personnel, and other local interviewers. These interviewers were asked to obtain from the persons in the selected group their own statements concerning periods of sanatorium treatment, as well as current status. When the person could not be located, information as to his death, or his moving out of the county was obtained from neighbors or local officials. The interviewers were asked to give special attention to reported moves to other States or counties. The follow-up was continued whenever a person was reported to have moved either to another part of New Jersey or out of the State. In cases where deaths were reported the registry of vital statistics was rechecked to determine whether the death certificates had been overlooked through carelessness. A summary of the results of this procedure follows:

	Total	White	Nonwhite
Untraced	37	23	14
Reported to be dead:			
Certificates located	7	4	3
Certificates not located	11	1	10
Total reported dead	18	5	13
Alive, whereabouts known	238	185	53
Total	293	213	80

The interview method was both costly and time-consuming, and did not prove as reliable as the central files in furnishing data about the patient's sanatorium history. It required more time for the interviewers to follow up a group one-fifth as large as the group for which clerks obtained the data from the central files. Dates for entering and leaving sanatoria were frequently in error, and the patients failed to report all of their stays. The sample disclosed three previous admissions hitherto unrecorded which reduced the number

of first admissions from 1,248 to 1,245. Additional information on sanatorium stays increased the number of first admissions later readmitted from 352 to 354 of the 1,245 cases.

Corrections were also made for the 18 deaths which were not located in the central files. This number could have been reduced by more uniform allocation of deaths occurring out of the State to the place of residence.

The second part of this procedure is concerned with a description of the characteristics of the 37 untraced persons. There were 23 untraced white persons in the sample of 213, and 14 untraced persons in the whole nonwhite group of 80 persons. If the sample of one-fourth of the whites is representative of the entire group of discharges, approximately 92 of the 852 living white cases were lost during the 5-year period. This, added to the 14 untraced nonwhite cases gives an estimated 106 cases out of the 1,248, or 8.5 percent whose whereabouts were unknown on January 1, 1947.

With regard to location, 22 of the 37 cases unaccounted for in the sample study were reported to have moved out of the State, and the place of residence of the remaining 15 was unknown. Although the 37 cases were untraced as of January 1, 1947, many of them had recorded readmissions or were known to be alive and residing in the State at some time during the 5 years of the study.

If there is a relationship between any determinable characteristic and the disappearance of patients after discharge, the mortality and readmission rates will reflect a bias due to this relationship. However, if the composition of the untraced population is similar to that of the traced persons the effect of the omission of the untraced from the calculations will result only in a general understatement of the rates in proportion to their number. An estimate of the possible bias which the omission of data about death and readmission for the untraced cases may impose upon the study can be made by comparing the composition of the entire group with that of the untraced cases. Table 1 compares the composition of the estimated 106 untraced cases with the composition of the total cases studied (1,248). The differences are not large, indicating that there will be little bias resulting from errors attributable to the lack of knowledge about the survival of the untraced cases. Some of the differences would seem to indicate that mortality among the untraced cases is less than for the cases whose history could be traced throughout the entire 5-year period.

Through these procedures the accuracy of the data for determining survival and readmission rates was ascertained. With respect to admissions, the data obtained from the central file were shown to be more reliable than those secured through interview; moreover, they were believed to contain a smaller percentage of untraced cases than had hitherto been true of other studies. Enough was known

TABLE 1.—*Comparison of the number and percent of persons in the study group with the estimated untraced group by selected characteristics*

	Number of cases		Percentage distribution	
	Untraced (estimated) as of Jan. 1, 1947	Total study group	Untraced	Total
Sex:				
Total	106	[1] 1,248	100.0	100.0
Male	46	678	43.4	54.3
Female	60	570	56.6	45.7
Race:				
Total	106	1,248	100.0	100.0
White	92	1,110	86.8	88.9
Nonwhite	14	138	13.2	11.1
Age:				
Total	106	1,248	100.0	100.0
17–19 years of age	5	83	4.7	6.6
20–29	47	454	44.3	36.4
30–39	36	288	34.0	23.1
40–49	14	206	13.2	16.5
50 and over	4	217	3.8	17.4
Stage of disease:				
Total	106	1,248	100.0	100.0
Minimal	11	183	10.4	14.7
Moderately advanced	41	497	38.7	39.8
Far advanced	54	568	50.9	45.5
Marital status:				
Total	106	1,248	100.0	100.0
Single	54	502	50.9	40.2
Married	37	630	34.9	50.5
Other	15	116	14.2	9.3
Manner of discharge:				
Total	106	1,248	100.0	100.0
With consent	59	729	55.7	58.4
Against advice	47	519	44.3	41.6
Length of stay on first admission:				
Total	106	1,248	100.0	100.0
0–2 months	21	248	19.8	19.9
3–5	18	202	17.0	16.2
6–11	15	341	14.2	27.3
12 months and over	52	457	49.0	36.6
Condition on discharge:				
Total	106	1,248	100.0	100.0
Arrested	16	141	15.1	11.3
Apparently arrested	30	230	28.3	18.4
Quiescent	14	180	13.2	14.4
Improved	32	428	30.2	34.5
Unimproved	14	269	13.2	21.4

[1] This figure represents the number of first admissions discharged before corrections were made from information obtained in the sample study.

about the composition of the untraced group so that the lack of follow-up information would not bias the analysis and conclusions. Unless the information concerning the composition of the untraced group can be secured from State Central Case Records, studies of this type made in the future should repeat this part of the procedure by individual follow-up, either on a sample basis or for the entire group of cases. This step may only be necessary, however, until

enough studies have been made to confirm the conclusion that the untraced are not significantly different from the entire study group. By recording all contacts with patients, State Central Case Records will ultimately obviate the necessity of using interviews to discover the untraced cases.

The central file method of follow-up is feasible, since a majority of States have been operating, or are beginning to operate some form of central case record system; for a number of years, too, several States have had systems resembling that used by New Jersey. Such registers, if maintained according to approved standards (*6*), comprise an excellent source of follow-up information.

DESCRIPTION OF THE POPULATION

The material to be presented and discussed in this section is limited to a description of the population. To avoid unnecessary repetition, the tables herein presented will not be included in the subsequent papers where more detailed analyses will be made. In addition to the intrinsic value of these descriptive data, they demonstrate the variety of information concerning discharged patients which can be collected from a central record system.

TABLE 2.—*Number and percent of persons in the study group by age, sex, and race*

Age groups	Both sexes	Males			Females		
		Total	Total white	Total nonwhite	Total	Total white	Total nonwhite
Total	1,245	677	613	64	568	496	72
17–19	83	29	28	1	54	48	6
20–29	452	174	160	14	278	238	40
30–39	288	168	144	24	120	106	14
40–49	206	139	127	12	67	59	8
50 and over	216	167	154	13	49	45	4
Median age	32	37	37	45	27	27	26.5
	Percent						
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
17–19	6.7	4.3	4.6	1.6	9.5	9.7	8.3
20–29	36.3	25.7	26.0	21.9	49.0	48.0	55.6
30–39	23.1	24.8	23.5	37.5	21.1	21.4	19.4
40–49	16.5	20.4	20.7	18.7	11.8	11.9	11.1
50 and over	17.4	24.8	25.2	20.3	8.6	9.0	5.6

Age, sex, and race.—Table 2 shows the distribution by age, sex, and race of the 1,245 cases selected for study. The sex ratio for all ages and all races is 119 males per 100 females. For the white population, it is 124 males per 100 females, which is significantly different from the ratio of 89 males per 100 females found in the nonwhite population. The knowledge of differences such as these can be of value in planning programs of case finding, sanatorium care, and rehabilitation.

The 136 nonwhite cases comprise 11 percent of the group whereas, according to the 1940 census, 5.5 percent of New Jersey's population was nonwhite.

The difference between the age distribution of the 1,245 cases by sex and that of the State population as a whole reflects, in part, the known age-group prevalence of tuberculosis, assuming death rates to be a measure of prevalence. The proportion of females aged 20–29 was double the proportion of this age group in the State in the 1940 census. For females between the ages of 30 and 39, the proportion in the study was identical with that reported in the census; and in the other age groups the proportions in the study were less than in the census. Among males, with high mortality rates spread over a greater span of years, there were larger proportions in the three age groups 20–29, 30–39, and 40–49 than in the corresponding ages in the general population.

TABLE 3.—*Number and percent of persons in the study group by marital status, sex, and race*

	Number in each marital category			
	Total	Single	Married	Other [1]
Both sexes, all races	1,245	502	627	116
White	1,109	458	562	89
Nonwhite	136	44	65	27
Males, all races	677	252	367	58
White	613	233	334	46
Nonwhite	64	19	33	12
Females, all races	568	250	260	58
White	496	225	228	43
Nonwhite	72	25	32	15
	Percent			
	Total	Single	Married	Other [1]
Both sexes, all races	100.0	40.3	50.4	9.3
White	100.0	41.3	50.7	8.0
Nonwhite	100.0	32.3	47.8	19.9
Males, all races	100.0	37.2	54.2	8.6
White	100.0	38.0	54.5	7.5
Nonwhite	100.0	29.7	51.5	18.8
Females, all races	100.0	44.0	45.8	10.2
White	100.0	45.3	46.0	8.7
Nonwhite	100.0	34.7	44.5	20.8

[1] "Other" includes divorced, widowed, and separated.

The median age of the males in the study was 37 years, and of the females, 27. The median ages of the white males and white females were the same as for each sex in the all races group; however, the median age of the nonwhite males was 45 and of the nonwhite females, 26.5 years. It appears that females both enter the sanatorium for the first time and are discharged at a much younger age than the males. There were 61 males per 100 females under 30

years of age, and 201 males per 100 females over 30 years of age. It follows that the rehabilitation of the tuberculous male patient will present problems quite different from those to be considered in planning rehabilitation for the female patient.

Marital status.—At the time of their first admission to the sanatorium, 54 percent of the men were married. This is shown in table 3, where the distribution of persons in the study is given by marital status, race and sex. In view of the large proportion of men who are married, it is evident that more than half of the male cases were likely to have heavy economic responsibilities. The attitude of these patients toward accepting sanatorium care until discharged with consent is undoubtedly affected by their responsibilities and a program for their rehabilitation must take account of this economic factor.

Despite the relatively high age of the men upon admission, the number of single males is nevertheless large. The expectancy of marriage for this group is probably low and their problems of rehabilitation will remain those typical of single, unattached individuals. The smaller proportion of married women is associated with the lower median age of females upon admission.

TABLE 4.—*Number and percent of persons in the study group by marital status, age, sex, and race*

Age groups	Males						Females					
	Single		Married		Other [1]		Single		Married		Other [1]	
	White	Nonwhite	White	Nonwhite	White	Nonwhite	White	Nonwhite	White	Nonwhite	White	Nonwhite
Total	233	19	334	33	46	12	225	25	228	32	43	15
17–19	28	1	------	------	------	------	46	5	2	------	------	1
20–29	130	9	30	3	------	2	135	15	94	21	9	4
30–39	47	7	91	12	6	5	31	4	61	8	14	2
40–49	16	1	99	10	12	1	9	1	44	2	6	5
50 and over	12	1	114	8	28	4	4	------	27	1	14	3
	Percent											
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
17–19	12.0	5.3	------	------	------	------	20.4	20.0	0.9	------	------	6.7
20–29	55.8	47.3	9.0	9.1	------	16.7	60.0	60.0	41.2	65.6	21.0	26.7
30–39	20.2	36.8	27.3	36.4	13.0	41.7	13.8	16.0	26.8	25.0	32.5	13.3
40–49	6.9	5.3	29.6	30.3	26.1	8.3	4.0	4.0	19.3	6.3	14.0	33.3
50 and over	5.1	5.3	34.1	24.2	60.9	33.3	1.8	------	11.8	3.1	32.5	20.0

[1] "Other" includes divorced, , widowed and separated.

The youthfulness and predominantly maiden status of the females, demonstrated in table 4, leads to a prediction of a high marriage rate for this group following discharge. This, too, should be considered in planning rehabilitation programs (*8*). The married individuals as a group are not as old as those divorced, separated, and widowed. Pro-

portionately more nonwhites than whites come from broken homes, and conversely, the former group has a smaller porportion of single individuals. Since the rehabilitation of the tuberculous patient involves consideration of the type of family unit to which he belongs, such statistical findings as the above should be augmented by case studies of representatives of each marital category to determine the relationship between marital status and willingness to accept sanatorium care and rehabilitation.

TABLE 5.—*Number and percent of persons in the study group by stage of disease on admission, race, and sex*

Race and sex	Stage of disease on admission			
	All diagnoses	Minimal	Moderately advanced	Far advanced
	Number			
All races:				
Total	1,245	183	496	566
Male	677	86	272	319
Female	568	97	224	247
White:				
Total	1,109	164	452	493
Male	613	76	249	288
Female	496	88	203	205
Nonwhite:				
Total	136	19	44	73
Male	64	10	23	31
Female	72	9	21	42
	Percent			
All races:				
Total	100.0	14.7	39.8	45.5
Male	100.0	12.7	40.2	47.1
Female	100.0	17.1	39.4	43.5
White:				
Total	100.0	14.8	40.8	44.4
Male	100.0	12.4	40.6	47.0
Female	100.0	17.7	40.9	41.4
Nonwhite:				
Total	100.0	14.0	32.3	53.7
Male	100.0	15.6	35.9	48.5
Female	100.0	12.5	29.2	58.3

Stage of disease on admission.—Table 5 shows that 15 percent of the group were minimal cases, 40 percent were moderately advanced, and 45 percent far advanced on admission. These proportions vary somewhat from the observations of Nimitz (*9*) who reports that on a nationwide basis 13 percent are minimal, 32 percent moderately advanced, and 55 percent far advanced. The smaller proportion of far advanced cases in this New Jersey study arises from the exclusion of first admissions whose sanatorium stays terminated in death. Within each stage there were also variations by race and sex. For example, the percent of moderately advanced cases is approximately the same for white males and white females, about 41 percent, but of the nonwhite males 36 percent were classified as moderately advanced as

against 30 percent for nonwhite females. The nonwhite females had the greatest percentage of far advanced cases (58 percent), which was very different from the white female group of the same diagnostic category (41 percent). The effect of stage of disease on mortality by sex and race will be one of the subjects discussed in the paper to follow.

TABLE 6.—*Number and percent of persons in the study group by age and stage of disease on admission*

Age groups	Stage of disease on admission			
	Total	Minimal	Moderately advanced	Far advanced
Total	1,245	183	496	566
17–19	83	22	38	23
20–29	452	73	189	190
30–39	288	40	116	132
40–49	206	24	78	104
50 and over	216	24	75	117
	Percent			
Total	100.0	100.0	100.0	100.0
17–19	6.7	12.0	7.7	4.1
20–29	36.3	39.9	38.1	33.5
30–39	23.1	21.9	23.4	23.3
40–49	16.5	13.1	15.7	18.4
50 and over	17.4	13.1	15.1	20.7

Older persons were admitted in the more advanced stages of disease (table 6). Any analysis of the subsequent history of discharged patients should therefore be made age-specific, so that this fact and the expected increase in mortality rates associated with increasing age may be controlled.

TABLE 7.—*Number and percent of persons in the study group by clinical status on discharge, sex, and race*

Clinical status on discharge	Number in each racial group					
	Males			Females		
	All races	White	Nonwhite	All races	White	Nonwhite
Total	677	613	64	568	496	72
Arrested	60	55	5	81	75	6
Apparently arrested	130	119	11	100	88	12
Quiescent	105	96	9	74	63	11
Improved	215	195	20	213	188	25
Unimproved	167	148	19	100	82	18
	Percent					
Total	100.0	100.0	100.0	100.0	100.0	100.0
Arrested	8.9	9.0	7.8	14.3	15.1	8.3
Apparently arrested	19.2	19.4	17.2	17.6	17.8	16.7
Quiescent	15.5	15.7	14.1	13.0	12.7	15.3
Improved	31.7	31.8	31.2	37.5	37.9	34.7
Unimproved	24.7	24.1	29.7	17.6	16.5	25.0

Clinical status upon discharge.—According to table 7, 9 percent of the group were discharged in an arrested condition after their first period of sanatorium care. White females had the highest proportion in this category, 15 percent; white males, 9 percent; and nonwhite males and females, 8 percent. There were proportionately more nonwhite patients than white patients discharged in the active categories. It is evident from this table that the white females leave the sanatorium in the most favorable condition, while nonwhite males leave in the least promising state of health. This was reflected in the death and readmission rates for the 5 years subsequent to discharge, which were generally lowest for white females.

TABLE 8.—*Number and percent of persons in the study group by stage of disease on admission and clinical status on discharge*

Stage of disease on admission	Clinical status on discharge					
	Total	Arrested	Apparently arrested	Quiescent	Improved	Unimproved
Total	1,245	141	230	179	428	267
Minimal	183	50	39	34	43	17
Moderately advanced	496	56	131	71	158	80
Far advanced	566	35	60	74	227	170
	Percentage distribution by stage of disease					
Total	100.0	11.3	18.5	14.4	34.4	21.4
Minimal	100.0	27.3	21.3	18.6	23.5	9.3
Moderately advanced	100.0	11.3	26.4	14.3	31.9	16.1
Far advanced	100.0	6.2	10.6	13.1	40.1	30.0
	Percentage distribution by clinical status on discharge					
Total	100.0	100.0	100.0	100.0	100.0	100.0
Minimal	14.7	35.5	17.0	19.0	10.0	6.4
Moderately advanced	39.8	39.7	57.0	39.7	36.7	30.0
Far advanced	45.5	24.8	26.0	41.3	53.3	63.6

Table 8 presents a summary of persons in each diagnostic group, distributed according to their clinical status upon discharge. Two proportionate distributions follow. The first employs as its base the stage of disease on admission, and shows the condition at time of discharge of the minimal, moderately advanced and far advanced patients. The second distribution is based on the clinical status on discharge so that it shows how many of the arrested, apparently arrested, and other categories, were minimal, moderately or far advanced on admission. The great advantages of admission in the early stages of the disease are evident from this table, for the minimal admissions, which constituted only about 15 percent of all persons included in the study, comprised over 35 percent of those with arrested disease on discharge. On discharge, 49 percent of the minimal,

and only 17 percent of the far advanced cases were in the arrested categories. Ten percent of the minimal, compared to 30 percent of the far advanced cases were unimproved on discharge. Of those discharged unimproved, two-thirds were far advanced on admission.

Manner of discharge.—An important element in the treatment of the tuberculous is the patient's ability to accept both the diagnosis and the recommended treatment, including sanatorium care. The inability of many patients to adapt themselves to institutional living often results in their leaving the sanatoria against advice. No statistical studies have previously been made analyzing the multiple characteristics of a patient population in relation to discharge "with consent" and "against advice."

TABLE 9.—*Number of persons in the study group by marital status, race, and manner of discharge showing proportion leaving against advice*

Race and marital status	Total	With consent	Against advice	Proportion discharged against advice
Total, all races	1,245	728	517	41.5
Single	502	340	162	32.3
Married	627	328	299	47.7
Other [1]	116	60	56	48.3
Total, white	1,109	665	444	40.0
Single	458	317	141	30.8
Married	562	301	261	46.4
Other [1]	89	47	42	47.2
Total, nonwhite	136	63	73	53.7
Single	44	23	21	47.7
Married	65	27	38	58.5
Other [1]	27	13	14	51.9

[1] "Other" includes divorced, widowed, separated.

While it is true that there is wide variation in applying the terms "with consent" and "against advice," it may be assumed that the patient discharged against advice is one who probably did not receive full benefit from sanatorium care. Almost 42 percent of all first discharges were against medical advice (table 9). This proportion was consistently higher for the nonwhite group as a whole (54 percent vs. 40 percent); it was also higher for the nonwhite patients in each marital category. In addition, both male and female single patients comprised the smallest proportion leaving against advice.

There was little difference observed in the proportions of males and females leaving against advice. Older patients of both sexes left against advice in larger proportions than the younger age groups (table 10).

The proportion leaving against advice varies with the stage of the disease, increasing as the disease become more advanced. Whereas 25 percent of those who entered the sanatorium as minimal cases left against advice, 39 percent of the moderately advanced and 50

TABLE 10.—*Number and percent of persons in the study group by age, sex, and manner of discharge*

Age groups	Males			Females		
	Total	With consent	Against advice	Total	With consent	Against advice
Total	677	394	283	568	334	234
17–19	29	17	12	54	39	15
20–29	174	109	65	278	167	111
30–39	168	108	60	120	63	57
40–49	139	70	69	67	39	28
50 and over	167	90	77	49	26	23
	PERCENT					
Total	100.0	58.2	41.8	100.0	58.8	41.2
17–19	100.0	58.6	41.4	100.0	72.2	27.8
20–29	100.0	62.6	37.4	100.0	60.1	39.9
30–39	100.0	64.3	35.7	100.0	52.5	47.5
40–49	100.0	50.4	49.6	100.0	58.2	41.8
50 and over	100.0	53.9	46.1	100.0	53.1	46.9

percent of the far advanced were so discharged. The progression for males and females, respectively, was found to be similar. The return home of so large a proportion of far advanced cases presents a responsibility of considerable magnitude to those concerned with tuberculosis control in the communities to which they return. The

TABLE 11.—*Number of persons in the study group by stage of disease on admission, length of stay, sex, and manner of discharge, showing proportion leaving against advice*

Stage of disease on admission and length of stay	Both sexes				Males				Females			
	Total	With consent	Against advice	Proportion leaving against advice	Total	With consent	Against advice	Proportion leaving against advice	Total	With consent	Against advice	Proportion leaving against advice
All stages	1,245	728	517	41.5	677	394	283	41.8	568	334	234	41.2
Under 3 months	247	76	171	69.2	155	48	107	69.0	92	28	64	69.6
3–5 months	202	110	92	45.5	116	59	57	49.1	86	51	35	40.7
6–11 months	340	214	126	37.1	184	119	65	35.3	156	95	61	39.1
12 months and over	456	328	128	28.1	222	168	54	24.3	234	160	74	31.6
Minimal	183	138	45	24.6	86	65	21	24.4	97	73	24	24.7
Under 3 months	48	23	25	52.1	26	14	12	46.2	22	9	13	59.1
3–5 months	45	38	7	15.6	21	17	4	19.0	24	21	3	12.5
6–11 months	65	56	9	13.8	31	27	4	12.9	34	29	5	14.7
12 months and over	25	21	4	16.0	8	7	1	12.5	17	14	3	17.6
Moderately advanced	496	304	192	38.7	272	164	108	39.7	224	140	84	37.5
Under 3 months	101	31	70	69.3	70	22	48	68.6	31	9	22	71.0
3–5 months	76	41	35	46.1	38	21	17	44.7	38	20	18	47.4
6–11 months	133	82	51	38.3	71	42	29	40.8	62	40	22	35.5
12 months and over	186	150	36	19.4	93	79	14	15.1	93	71	22	23.7
Far advanced	566	286	280	49.5	319	165	154	48.2	247	121	126	51.0
Under 3 months	98	22	76	77.6	59	12	47	79.7	39	10	29	74.4
3–5 months	81	31	50	61.7	57	21	36	63.2	24	10	14	58.3
6–11 months	142	76	66	46.5	82	50	32	39.0	60	26	34	56.7
12 months and over	245	157	88	35.9	121	82	39	32.2	124	75	49	39.5

longer period of hospitalization generally required at later stages of the disease partially explains the observed variation for the longer the required stay, the greater the opportunity for leaving against advice. Table 11 presents the proportion of males and females leaving against advice both by stage of disease and length of stay.

CONCLUSIONS

The method of using centralized records for the study of persons discharged from sanatoria, in addition to being simple and inexpensive, has several major advantages. Comparable studies encompassing larger groups of patients can be made in great numbers and at frequent intervals; also, the effect of untraced persons on over-all data can be assessed. Studies of this kind, made periodically and under uniform conditions, will reveal trends in postsanatorium survival and readmission rates, and will permit the determination of death rates by such factors as age, race, sex, marital status, stage of disease, condition on discharge, and manner of discharge.

An attempt was made to compare the composition of the New Jersey group with the populations used in earlier studies of discharged patients. However, all of the earlier investigations differed from the present study in the criteria employed in selecting cases for follow-up. Moreover, it was found that methods employed for selecting cases in the earlier studies differed widely from one study to another. It was therefore difficult to make comparisons or to arrive at proper conclusions.

Earlier studies, too, were of limited application because, by combining the data concerning patients discharged over a span of years, they obscured such factors as year-to-year changes in composition of the patient population, changes in methods of medical care, and mortality trends. For example, the combining into one group of all live discharges from one State and 14 county sanatoria for each year from 1925 to 1935 in the Minnesota study by Hilleboe (*2*) conceals changes in methods of tuberculosis control during the 10-year period, and makes it impossible to compare survival rates with those found in later studies. The Stephens study (*10*), in grouping the 20-year findings relating to reactivation of tuberculosis among "cured" cases embodies these same difficulties.

Another study (*11*), covering patients discharged from Maryland tuberculosis sanatoria from 1935 to 1940, though termed a 5-year follow-up, did not actually follow the entire group of patients for the full 5-year period. Instead, it followed for the full period only those cases discharged in the first year, and observed the remaining patients for shorter periods, depending upon date of discharge. This procedure is feasible in life-table construction, since the population is adjusted each year to remove those cases who are no longer under observation;

the death rates yielded by this method, however, are not as significant as those found when all patients are followed for a given length of time. The present study, if repeated at fixed intervals, with uniform periods of follow-up, would reveal information significant to workers in tuberculosis control.

Another advantage of the use of the present method lies in the fact that data can be consistently analyzed for any given factor which may influence trends. Because data obtained by this method are consistent and comparable, differences in population characteristics which may be discovered from study to study can be controlled. Such a comparison was not possible with the Hilleboe study (*2*), where the survival rates are presented for *both* sexes in a single age group, 20–49, by stage of disease and sputum status upon discharge. In his study, although the author recognized that "sex, length of stay, number of readmissions, occupation and collapse therapy" affect survival, all these factors are omitted in the calculation of survival and mortality rates.

A comparison of the 5-year death rates found in the present New Jersey study with those presented by Hilleboe in the Minnesota analysis, adjusted to make them as nearly comparable as possible, reveals marked similarity in rates. However, since there is no way of ascertaining whether the two groups of patients involved are actually comparable with respect to age, sex, and other characteristics, no valid conclusions can be drawn from the comparison. Where differences in survival rates are observable in these two studies, it is impossible to determine whether they are attributable to improvements in methods of treatment, differences in age and sex distribution, differences in marital status proportions, or changes in the proportions of patients discharged in the arrested categories.

Another study (*12*), concerning Minnesota ex-patients, not only included long spans of time (1916–25 and 1926–35), but also confined itself to *single* admissions with 90 days or more of residence in an institution. Thus, those patients who were so ill that they had to return to the sanatorium for further treatment were ignored. As would be expected, even though the periods studied were much earlier, the survival rates presented are higher than those found for the New Jersey discharges.

The study of patients discharged from Maryland sanatoria (*11*), had a number of features similar to the New Jersey study. It included a break-down by race and the stage of disease on admission but ignored sex and age. The New Jersey patients, when compared to the Maryland groups, were found to have a lower death rate among far advanced cases, about the same rate among moderately advanced cases, and a higher rate among minimals. The variations could not be interpreted to determine whether they were due to different

methods of analysis, as previously discussed, differences in the composition of the respective groups, or improvements in methods of treatment between the two 5-year periods.

The most comprehensive study of sanatoria discharges previously made was the Whitney and Dempsey 5-year follow-up study (*5*) of 6,906 patients discharged alive in 1933 from 75 sanatoria in 16 States. This study included readmissions in the base year. When compared to the whole group of 1,678 patients in the New Jersey study, the groups were found to be sufficiently similar to indicate that the New Jersey group was a representative cross section of sanatorium discharges in general.

The proportions of white and nonwhite cases and of minimal, moderately advanced and far advanced cases were about the same in the two studies. Unlike New Jersey, however, there were more females than males in the Whitney and Dempsey study. The median age of the women was identical, but the male patients in New Jersey were older. On discharge, larger proportions of the New Jersey patients were placed in the arrested categories, which in turn was reflected in a lower gross mortality rate and a lower rate for the far advanced cases. More of the New Jersey patients were discharged against advice than Whitney and Dempsey reported. The latter did not use the life-table method of analysis, and suggested that future studies of discharged patients be confined to first admissions in the base period, as has been the policy in the analysis of the New Jersey data.

The method used in the present study made it possible to ascertain the characteristics of the untraced population in comparison with those of the rest of the study group. By so doing, it was possible to assess the exact effect on general findings of the lack of follow-up information concerning untraced patients. Earlier studies have approached this problem diversely. In the Hilleboe study (*2*), the untraced persons were omitted from consideration entirely, while, in the Maryland study (*11*), they were included and considered to be unselected in regard to mortality. The latter assumption, however, can be considered justifiable only when the composition of the untraced group is known to be essentially like that of the traced patients.

These conclusions demonstrate that the method employed in the New Jersey study provides adequate data for a description of the demographic and clinical characteristics of persons discharged from tuberculosis hospitals.

SUMMARY

1. A method has been developed for studying the characteristics of persons discharged from tuberculosis sanatoria and determining significant events in their subsequent history.

2. The outstanding feature of the method is its use of available

central records for the collection of data which are suited to new applications of the life-table method of analysis. The application of the life-table techniques to the analysis of mortality and readmission rates will be presented in two future papers. Another will deal with discharge "with consent" and "against advice."

3. Within the limits of the accuracy and completeness of the central files, the method has been found equal or superior to the use of personal interviews for following patients after discharge.

4. In this first report the method has been described and then applied to the study of 1,245 persons discharged alive from New Jersey sanatoria between July 1, 1941, and June 30, 1942.

5. A description of the group studied, with respect to selected characteristics, shows that:

a. There were 119 males per 100 females.

b. The proportion of nonwhite persons (11 percent) is twice as large as the proportion reported in the 1940 census for the State.

c. The median age of the men was 37 years and of the women, 27 years, at the time of first admission.

d. Nearly 60 percent of the females were *under* 30 years of age, and an even larger proportion of the nonwhite females had not reached their thirtieth birthday at the time of admission to the sanatorium.

e. Nearly 70 percent of the men were *over* 30 years of age. The median age of the nonwhite males was 45 whereas that of the white males was 37.

f. More than half of the men were married. The proportion of married women (45.8 percent) was about equal to the proportion of single women (44 percent). More nonwhite patients came from broken homes (20 percent vs. 8 percent).

g. The admission diagnosis for 13 percent of the group was minimal tuberculosis; 40 percent had moderately advanced, and 47 percent far advanced disease.

h. The proportions of white and nonwhite patients leaving sanatoria against advice were 40 percent and 54 percent, respectively. A disproportionately large number of older persons left against advice. Married men, divorced, widowed, and separated men and women were the marital groups most likely to leave against advice. There is a direct relationship between the proportion leaving against advice and the stage of disease on admission; the proportion leaving against advice is inversely related to the length of stay.

i. On discharge there were larger proportions of white females in the *arrested* and *quiescent* categories than any other group. Nonwhite males comprised the greatest proportion in the

active categories. Patients classified as minimal on admission generally left the sanatoria in an arrested or quiescent condition while those whose disease was far advanced comprised 70 percent of the active categories when discharged.

6. The method of using central files such as central case registers for following patients discharged from sanatoria can produce a great number of studies repeated at frequent intervals. The studies would provide a large body of data, comparable in all respects, for determining the answers to many unsolved problems in tuberculosis control.

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REFERENCES

(1) Hilleboe, H. E.: Comparative mortality of patients discharged from tuberculosis sanatoria. Am. Rev. Tuberc. **34:** 713 (1936).
(2) Hilleboe, H. E.: Follow-up study of patients discharged from tuberculosis sanatoria. Nat. Tuberc. A. Tr. **34:** 149 (1938).
(3) Brieger, Emil: Statistical classification. A new type of enquiry card for tuberculosis statistics. Papworth Research Bull. **2:** 113 (1938).
(4) Kiefer, Norvin: Present concepts of rehabilitation in tuberculosis. A review of the literature, 1938–47. Nat. Tuberc. Assoc., New York (In press).
(5) Whitney, Jessamine S. and Dempsey, Mary V.: A study of patients discharged alive from tuberculosis sanatoria in 1933. Nat. Tuberc. Assoc., Social Research Series, No. 8, New York, 1942.
(6) State central case record systems and local case registers for tuberculosis. Federal Security Agency, U. S. Public Health Service, Tuberculosis Control Division, Washington, D. C., 1947.
(7) Tuberculosis facilities in the United States. J. A. M. A. **114:** 791 (1940).
(8) Hudson, Holland: Young married women patients. Bull. Nat. Tuberc. Assoc. **25:** 169 (1939).
(9) Nimitz, H. J.: The problem of tuberculosis in the average community. Diseases of the Chest **10:** 528 (1944).
(10) Stephens, Margaret G.: Follow-up of 1,041 tuberculosis patients. Am. Rev. Tuberc. **44:** 451 (1941).
(11) Gauld, Ross L., Halliday, C. H., Cullen, Victor F., and Fales, W. Thurber: A five year follow-up of discharges from Maryland Tuberculosis Sanatoria. Am. J. Pub. Health **31:** 568 (1941).
(12) Hastings, D. R. and Doerr, Esther R.: Follow-up study of tuberculous patients. Am. Rev. Tuberc. **40:** 131 (1939).

SOME ECONOMIC AND EMOTIONAL PROBLEMS OF THE TUBERCULOSIS PATIENT AND HIS FAMILY[1]

By Sophia Bloom, A. M., *Chief Medical Social Consultant, Tuberculosis Control Division, United States Public Health Service*

The impact of the diagnosis of tuberculosis is usually severe, both for the individual patient and the community. The patient reacts to the medical problem and the consequent social dislocation in a variety of ways, but for no one is it easy. It follows that in addition to medical care we must consider social care an essential objective in a comprehensive and effective control program planned to eradicate tuberculosis.

Whenever the economic, emotional, or other social problems of the tuberculous are considered, it is usual to think only of those persons whose livelihood is threatened, who cannot pay for medical and sanatorium care, and who must ask for public relief for their families. It is not so frequently recognized that all persons suffering from tuberculosis have economic and social problems which are an inherent part of the illness. Even if some patients can pay for sanatorium care, it is often at considerable sacrifice. Living standards for the family may be sharply reduced. Strain and anxiety may result when there is constant worry over finances, when the education of children is interrupted or ended, and family plans disrupted. Emotional adjustments of a profound and complex nature have to be made by the stable person as well as by the unstable, and the difference is merely one of degree of intensity.

It is estimated that about 500,000 persons have tuberculosis at the present time. About one-half of these are known to health departments. When we consider that the majority of these persons are adults who probably have families and dependents, we realize that a large segment of our population either suffers directly from the disease or is seriously affected by it.

Although it has long been recognized that in addition to medical needs the tuberculous patient may have a multitude of problems, it is only recently that widespread efforts have been made to evaluate and meet the social needs of the individual and the community. These social needs are largely emotional and economic and because they are interrelated, cannot be arbitrarily separated. I shall, however, discuss the basic economic difficulties and some of the major emotional problems created and intensified by tuberculosis.

Tuberculosis is a chronic and expensive disease, and few persons are able, alone, to meet the cost of medical care. Moreover, most patients cannot support their families throughout the period of financial

[1] Speech given by Miss Sophia Bloom at 34th Annual Mississippi Valley Conference on Tuberculosis September 8, 9, 10, 1947, Chicago, Ill.

dependency. The time involved is usually lengthy, since it includes the total period of medical treatment and rehabilitation. The patient must, therefore, often ask for help from the community for either medical care, support, or both.

There are, then, two major economic problems to be considered:

1. The long-drawn-out costs of expensive medical care.

2. The cost to the community of financial relief and medical care.

The extent to which the financial problem is met varies greatly in different communities, both with regard to public and private resources. Private relief-giving agencies are often reluctant to accept tuberculosis patients for financial assistance primarily because of the long-time and expensive problems which they present, and because of the agencies' limited funds.

Various forms of public relief are available in this country. For the most part persons without income depend upon public relief, of which there are three forms: (1) general relief, (2) the categorical assistances—Aid to Dependent Children, Old Age Assistance, Aid to the Blind—and (3) the social insurances. Social insurance has the very important advantage of providing benefits as a right and arouses no feelings of humiliation, but this program is not yet sufficiently general in coverage, and the form which could protect the tuberculous patient—disability insurance—has not yet been developed.

General relief and the categorical assistances are the usual sources of support and are often used to supplement each other. They differ in two respects: the funds for the assistance programs come from Federal, State and local sources, and those for general relief from State and local funds only. The standards of the assistance programs may be higher.

Marked variation and inequality of relief distribution exist among the various States and local communities. Federal grants-in-aid received by the States must be matched by State funds, and most of the States receive the three kinds of grant-in-aid funds. In a number of States there is no State-wide general relief, and in those States the financial care of persons without resources is the responsibility of the county. The only aid may be from the categorical assistance programs which in tuberculous families is usually Aid to Dependent Children.

The sums given in many places are insufficient to maintain a minimum standard of living. In some States, too, there is a ceiling or limit on the amount available for a given family, regardless of its size or the circumstances, and the amount of relief given is not determined by a family's needs but by arbitrary administrative or legal regulations. I was told recently of one State which raised the ceiling from $25 to $75 per month. Even this increase is insufficient to maintain most families. We find also, and often, that even where

there are laws that permit appropriations for relief, and where budgets are devised to set the minimum standard, the necessary funds are, for one reason or another, not appropriated. As a result, needy people may receive only a percentage of a minimum allowance. When this occurs the intent of the law is not fulfilled and the needs of the people are not met.

In a few places, relief budgets are maintained at the minimum, and in several places small additional amounts are given to the families of the tuberculous. This, however, is exceptional. In much of the country, families of the tuberculous like other persons unable to maintain themselves, are living for varying periods of time extending often over many years, on sums of money which, for the most part, are obviously inadequate and, at best, are scarcely sufficient to meet the barest necessities of life. This is hard on all dependent persons. We cannot help but wonder about its physical effects on people who are ill or who have been exposed to a disease such as tuberculosis. Normally, we think such persons may require additional, rather than less, care.

Sometimes, those of us who care for the patients, in our desire to help them and to relieve financial distress, may emphasize the fact that the family is eligible to apply for relief. We tell the man who is concerned about his dependents that he need not worry, that his wife can go to the nearest department of welfare and apply for assistance. It is true that she can, and often she does, but the patient may still have cause for concern. In addition to the blow to his pride, and his chagrin that he is no longer able to care for his family, there is the knowledge that his wife may have a difficult and possibly humiliating experience. It will disturb him if the amount of aid received will not be enough to meet the family's actual physical needs alone, to say nothing of the social and recreational interests that all people must have for health and happiness. Is it possible for such a man, facing a long period in the sanatorium, and another period of convalescence and rehabilitation, not to worry about the present and future well-being of his family? Living on inadequate or on barely adequate sums presents a constant source of anxiety, resentment and frustration. When there is deprivation in the family the patient cannot help but share the suffering of his family.

In other instances, relief is not available or is so limited that patients cannot accept the medical attention offered because they must continue to support their families. This was exemplified by the case of a laborer with three small children who was forced to continue working on the roads after a diagnosis of tuberculosis. When relief assistance was finally made available the disease had progressed from one lung to the other, and his wife was discovered to have tuberculosis also!

For the patient with tuberculosis, economic insecurity intensifies

any existing emotional problems of anxiety over illness, fears for the future, and the sense of personal inadequacy and insecurity. It is one more traumatic problem in a series of problems that begins with the diagnosis, or earlier, and continues through the period of rehabilitation. Physical recovery may be seriously affected or retarded. We all know too well the patients who return to work too soon in order to earn a living, and who frequently suffer recurrences, at increased cost to themselves and the community.

Two other important factors in the medical and social care of the patient are the restrictions and difficulties of the residence laws and of the means test. That the State is responsible for the welfare of its people was accepted in the structure of English government 350 years ago. In order that no geographical section be unduly burdened with people from other areas, the residence, or settlement laws became at that time part of the pattern of State responsibility. This concept has carried over, and the means test, originally devised to determine eligibility for relief at less than the lowest prevailing wage rate (rather than according to our present day concept of need) has also remained in the pattern, although 6 States do not apply it to tuberculosis. Both present problems to us today in the care of the tuberculous, and in the control of a contagious disease which respects neither State nor county boundaries, nor the economic status of individuals.

Complex residence laws make it possible for a person to lose residence in one locality before he gains it in another. The length of time required to secure legal settlement in the various States ranges from 1 year to many years. A person who leaves one State may lose his residence after 1 year's absence but may not yet have become a legal resident of the new State. If he becomes ill, it is necessary to determine his place of residence to ascertain eligibility for medical care and often neither State wishes to assume responsibility. It may be months before the matter is resolved, with consequent difficulty for the patient. Intrastate, as well as interstate, residence problems exist when individuals have lived in the State long enough to gain State residence, but not long enough to gain county residence. In such instances, the State can assume the responsibility with or without charge to the county. The patient who is a nonresident of a given locality is just as much a health menace as the patient who has residence. Even if we ignore human values, it is obvious that the community's health is endangered when hospitalization is refused the nonresident. There are many instances of refusal or delay in providing medical care to sick people who have no residence.

Briefly, then, we find that provision for economic care ranges from little assistance in some communities to a minimum relief standard in others, with many intermediate variations. This only results in tragic

experiences for most of those who, their lives complicated by a serious illness, must depend upon others for support.

The economic problems of tuberculosis, with some reference to the emotional implications of financial insecurity, have been considered. However, other problems in tuberculosis, particularly the emotional ones connected with the acceptance of the diagnosis, are of great significance. There are many reasons for the emotional difficulties experienced by almost all patients despite economic advantage, education or social position. Among these are the shock of the diagnosis, fears, anxieties, superstitions, sense of shame, and despair. Almost all patients show signs of resisting the diagnosis, and of refusing to accept it, and this resistance and nonacceptance may increase rather than lessen with time. We are confronted with resistance to the diagnosis, resistance to sanatorium care, resistance to careful rehabilitation, resistance, in short, to tuberculosis! We are all familiar with this and we all struggle with it daily. Resistance may lead to a display of anger, sullenness, refusal to follow directions, leaving the sanatorium against advice, a false and too speedy acquiescence, or it may take some other method of displaying itself.

Regardless of the way the patient shows or conceals his feelings, we know he is emotionally affected. Frequently during shock intelligent people behave as though they were stupid or lacked ordinary common sense. Often such a reaction is surprising, particularly if it continues over any length of time. We all know that patients, in order to handle tuberculosis, need to learn certain facts about themselves and their illness. In our efforts to help them we may devote almost all our energies to explaining facts to them. We may forget that people who are emotionally upset do not take in such information, often do not even hear our words. Preoccupied by an inner fear, the sense of security and adjustment gone or badly shaken, they cannot listen to and absorb our explanations. The facts are needed, certainly, and these should be given when the patients show they want them and in the amounts that they are able to absorb at a given time. But even before and along with this we must respond sensitively to their emotional needs. The doctors, nurses, social workers, and others concerned with the care of the patient, can help immeasurably by conveying genuine understanding of the severity of the blow and by appreciating the patient's point of view. If we are able to help him feel that he and the diagnosis are accepted by others, the more possible will it be for him to accept the diagnosis and himself.

Problems often become manifest at the point of diagnosis, or before, if the diagnosis has been in doubt and the patient has had to wait during an anxious period for the final decision. The person whose defenses have been suddenly and harshly penetrated, who is suddenly

faced with the necessity of an immediate adjustment to a new and terrifying situation, will respond as he has been accustomed to respond to other life demands. If he is sufficiently secure emotionally within himself and with those he considers closest to him and upon whom he depends, he will show signs, sooner or later, of the strength to meet the blow. He will turn for comfort to the person or persons upon whom he depends. If he receives this comfort, he is strengthened; if it is not given, he will suffer even more. If he is an insecure person, it will be harder for him to meet this new and frightening situation. Many patients, when first diagnosed, show as the first reaction very real apprehension as to the reaction of the husband, or wife, or sister, or whoever fills this important role in his life. I remember the young woman whose first reaction after learning the diagnosis showed some insecurity with respect to her husband. Her comments were all in relation to him. He might be angry, he would not like it, he would be angry if she left the children, what would he say, and so on. She was obviously unable to think of anything else, and could not talk about herself. This woman and her husband returned together the next day, and her first words showed great relief. Her husband had said, "It's all right; she should do what the doctor said." He was very helpful to her throughout the time of illness, and she adjusted to hospital routine and discipline very quickly, showing always a strong dependence upon her husband who adequately met her need for security.

Another woman, who was unable to speak when told the diagnosis, telephoned calmly two days later, "to go ahead with getting her in the hospital." Her sister, who was older and whom she regarded as a mother, had told her that she wanted her to do what the doctor said and that she would take care of her always.

The patient's emotions are an integral part of the realities of his life. If he faces financial insecurity he has emotions about it; if his home is to be broken up, his children sent away, or if his wife goes to work, he may experience severe sensations of humiliation, doubt, shame, frustration, and resentment. If he feels a loss of status and prestige he will be increasingly sensitive. Many problems are made worse by the stress and strain of an illness such as tuberculosis. A shaky marriage may crash altogether. The man who formerly felt his wife respected him only because he provided for the family may now feel he has lost everything. The woman who fears that she may lose her husband anyway, may be convinced that tuberculosis represents the end of things for her. The young person, believing his career thwarted, may lose hope and ambition. Many people, who defy treatment and refuse to follow directions, may in reality be struggling against a desire to be dependent, to be cared for. Because

they wish it so much, and are afraid of the wish, they struggle to maintain a show of independence and cannot relax quietly. Others, as we all know, seem to sink gladly into a way of life in which they are prevented from being independent, and from which they resist being helped to resume the activities of an independent adult life.

In view of the social problems mentioned, and many others not discussed, there has been a growing interest in extending social services for the tuberculous. Both the National Tuberculosis Association and the United States Public Health Service have been developing nation-wide programs to encourage the extension of these services.

The social problems are, of course, of interest and concern to all professional persons caring for the patient. It is, however, the social worker who has the primary responsibility for social study and evaluation and for the social treatment based upon the facts and their relation to the personality, attitudes, and needs of the individual patient. In addition to financial problems and necessary social adjustments, such as care of children, many patients will require help with the emotional problems created, or intensified, by illness. It is the patient's relationships with others which help strengthen him during periods of emotional disturbance, and he will turn to the social worker for help in accordance with his need and her ability to meet this need. For example, if he is dependent, she may help by understanding why he needs to lean on others for a time, and will allow him to do so, without fostering the dependence. All persons engaged in the care of the patient need to understand his psychological and emotional behavior. The professional training and experience of the social worker give her an insight into human behavior and are an essential source of her case work skill and knowledge, her principal contribution to the care of the patient.

The social worker plays a part in the various aspects of tuberculosis control programs. Although the degree of activity may vary, the general functions remain the same in every phase of the treatment process. That is, the worker assumes the primary responsibility for studying, evaluating, and treating the social problems, either through her own efforts or in conjunction with others by referral to appropriate agencies.

In case finding, for example, which is the primary responsibility of the public health nurse, the social worker may be asked to help in particular situations. In medical treatment, she will work with those patients who need her help. The social worker, along with other professional persons, under the leadership of the physician, will help prepare the patient for a rehabilitation program, will evaluate his emotional readiness to participate in it, and will continue to help him throughout the entire period with the economic and social problems with which he will be faced.

Experience has shown that social workers can help effectively with the economic and social aspects of tuberculosis, and we hope the time will come when many more social workers will be available to work directly with patients and to act as consultants in health departments.

Fifty thousand persons died of tuberculosis last year in the United States. Today there are about a quarter of a million known cases. It will take the combined efforts of all of us, of society as a whole, to combat this disease and to care for its victims. Economically and emotionally, the disease can be devastating. We must meet these fundamental problems in tuberculosis if we are to achieve its eventual control.

ABSORPTION OF BACTERIOSTATIC QUANTITIES OF FATTY ACID FROM MEDIA BY LARGE INOCULA OF TUBERCLE BACILLI [1]

By: Bernard D. Davis, *Surgeon, United States Public Health Service*

In the course of investigations in this laboratory concerned with the development of improved media for the cultivation of tubercle bacilli (*1*, *2*, *3*), it was observed that somewhat more rapid and dispersed growth could be obtained in liquid media by adding a small amount of a water-soluble ester of oleic acid, "Tween" 80,[2] while the addition of serum albumin permitted initiation of growth by small inocula. No further response was observed, however, upon the addition of any of the known vitamins.

It has long been known that large inocula of tubercle bacilli can grow in various synthetic media which fail to support initiation of growth by smaller (but not necessarily minute) inocula. Earlier workers (*4*) generally agreed that the success of the larger inocula was probably due to their contribution of unknown growth factors to the media. This assumption is supported by recent evidence that the characteristic lag in cell division of certain other bacteria (*5*) and yeast (*6*), observed following transfer from a growing culture in a synthetic medium to a fresh lot of the same medium, persists until metabolism of the organisms has produced in the medium a critical concentration of some unknown metabolite. The isolation of such a metabolite, if produced by tubercle bacilli, would be of value in the development of improved media. Accordingly, filtrates of cultures of the organism were studied.

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[1] From the Office of Field Studies, Tuberculosis Control Division and the Laboratories of the Rockefeller Institute for Medical Research, New York, N. Y.

[2] Polyoxyethylene sorbitan monooleate, marketed under the trade mark "Tween" 80, and furnished through the courtesy of the Atlas Powder Co., Wilmington, Del.

It was found, as anticipated, that exposure of the medium to large numbers of growing tubercle bacilli did improve its capacity to support the growth of subsequent small inocula. Further study showed, however, that removal of inhibitory traces of fatty acid, rather than addition of a growth factor, was responsible for the improvement in the medium. This mechanism is consistent with Drea's report (*7*) that the capacity of synthetic media to support small inocula is considerably improved by precautions to avoid the introduction of traces of lipids and other toxic materials. It is also paralleled by our own observation (*8*) that serum albumin acts primarily as a protective rather than a nutritive growth factor.

METHODS

The bacteriological methods have been described in detail (*2*). The medium consisted of a salt mixture buffered by phosphate at pH 7.0, enzymatic casein hydrolysate, yeast autolysate, glucose, and 0.05 percent "Tween" 80; where specified, there was also added 0.1 percent bovine serum albumin (Fraction V, Armour), which had been heated in neutral solution at 56° C. for 30 minutes to destroy the activity of the lipase which contaminates it (*9*). The tubercle bacilli were a standard virulent human strain, H37Rv, which had been transferred many times in this "Tween"-albumin medium. Inocula are designated in the table as volumes of a 10-day-old culture containing approximately 1 mg. moist weight (0.2 mg. dry weight) per ml.

RESULTS

It was repeatedly observed that after tubercle bacilli had grown in the "Tween" medium without albumin for 3 to 7 days, the filtrate permitted initiation of growth by inocula 1/10 to 1/1,000 as large as the minimal effective inocula in control medium. In the "Tween"-albumin medium, however, which is much more receptive to small inocula, no difference in growth in filtrate and control medium was perceptible.

Elucidation of the role of albumin in the medium suggested an explanation of the mechanism by which albumin eliminated the benefits of exposure of the medium to growing tubercle bacilli. The "Tween" was found to contain sufficient free oleic acid (*10*) to make the medium bacteriostatic to small inocula of human tubercle bacilli, which are sensitive to less than 1 μg/ml.; the albumin acts as a protective growth factor by binding the fatty acid (*8*). It therefore appeared possible that the significant difference between filtrate and control medium might lie in the content of free fatty acid; such a difference would naturally be concealed in bacteriological experiments in the presence of albumin.

Accordingly, an experiment was undertaken to test the ability of large inocula of tubercle bacilli to remove oleic acid added in amounts which inhibit small inocula. In order to avoid complicating the results by the presence of unknown amounts of fatty acid in addition to those added, fatty acid-free "Tween" 80 (*11*) was used in the medium.

Volumes of 35 or 70 ml. of medium containing 0.05 percent fatty acid-free "Tween" 80 and varying concentrations of added oleic acid were autoclaved in flasks; certain lots were then inoculated with approximately 10^{-1} mg. of tubercle bacilli per 5 ml. All flasks were incubated for 6 days at 37° C., following which the inoculated media were separated from their fairly heavy growth of bacteria (estimated at 1 mg. per ml.) by filtration through sintered glass (Corning UF filters). Control experiments showed that filtration itself did not remove the fatty acid. The amount of water which had evaporated was replaced in all the media, and sterile oleic acid (in alkaline aqueous solution) and heated bovine serum albumin were added aseptically as indicated. The media were then distributed in volumes of 5 ml. in sterile, wide (25 mm.), metal-capped test tubes, inoculated with varying amounts of tubercle bacilli, and incubated at 37° C.

TABLE 1.—*Growth of small inocula of tubercle bacilli following absorption of bacteriostatic quantities of oleic acid by growth of large inocula*

Added before preliminary incubation			Added after infiltration			Inoculum (mg. moist weight per 5 ml.)				
Oleic acid (μg./ml.)	Tubercle bacilli (10^{-1} mg. per 5 ml.)		Oleic acid (μg./ml.)	Albumin (percent)		10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}
						Growth				
0	0	Incubate 6 days, filter	0	0	Inoculate sterile filtrate, incubate 10 days, record growth	4	3	2	1	½
2	0		0	0		4	2½	½	0	0
5	0		0	0		4	0	0	0	0
10	0		0	0		½	0	0	0	0
0			0	0		4	3	2	1½	1
2			0	0		4	2½	2	1½	½
5			0	0		4	2½	2	1½	½
10			0	0		4	3	2	1½	½
0			2	0		4	2½	½	0	0
0			5	0		2½	0	0	0	0
0			10	0		0	0	0	0	0
0	0		0	0.1		4	3½	2½	2½	2
10	0		0	0.1		4	3½	3	2½	1½

Growth recorded at 10 days
0=no visible growth
4=full growth

Growth after 10 days of incubation is recorded in table 1 as estimated visually (full growth corresponding to ca. 2 mg./ml). In the absence of added oleic acid, the filtrate had no significant advantage over the control medium.[3] As the concentration of oleic acid was

[3] The earlier positive results had been obtained with unpurified "Tween" 80, which added to the medium 2 to 4 μg./ml. of oleic acid.

increased to 2, 5, and 10 μg/ml., the capacity to support small inocula progressively fell, while the filtrates from these three media showed no deviation from the pristine capacity of the medium without added oleic acid to support small inocula. When the oleic acid was added after filtration, however, the behavior of the filtrates was identical with that of the control media.

These results show clearly that: (1) growing tubercle bacilli eliminated the bacteriostatic effect of added oleic acid from the medium; (2) the bacteria did not contribute to the medium a protective growth factor capable of neutralizing subsequently added oleic acid; and (3) there is no evidence that the bacteria contributed a nutritive growth factor to the medium. It appears certain that the tubercle bacilli absorbed the free oleic acid. The other possible interpretation of the data, showing that the bacteria contributed a neutralizing substance to the medium in the presence of a trace of fatty acid, but not in its absence, cannot be considered seriously. In this connection it may be noted that the filtrates contained no protein detectable with concentrations of trichloracetic acid that precipitated amounts of albumin (0.01 percent) too dilute to be protective.

Preliminary experiments have indicated that the oleic acid cannot be removed by similar amounts of heat-killed bacilli; it is eliminated by bacterial metabolism rather than by simple adsorption. This utilization is consistent with the observation (*8*, *12*) that fatty acids act as a growth factor for tubercle bacilli (especially the avian variety, but also to a slight extent the human strains) when the concentration of free fatty acid is kept low by the addition of albumin.

Although these results were obtained with media containing added oleic acid and "Tween" 80, fatty acids are such ubiquitous contaminants, and tubercle bacilli so extraordinarily sensitive to them, that there is little reason to doubt the relation of this phenomenon to the well-known failure of small inocula of tubercle bacilli to grow in other media. The phenomenon is also closely related to the problem of the lag phase. We have reported elsewhere (*8*) that the addition of serum albumin reduces the lag in the visible expansion of surface inocula of tubercle bacilli on Long's synthetic liquid medium, presumably acting by binding traces of fatty acids or other inhibitors. Both the failure of growth of small inocula and the lag of this bacterial species are therefore considered to be due to the presence in the media of toxic substances, which are antagonized by albumin and are tolerated and eliminated by large inocula. These observations, however, do not contradict the evidence that the lag phase or failure of growth of small inocula of other bacteria may depend upon the absence of growth factors rather than the presence of growth inhibitors.

SUMMARY

Large inocula of tubercle bacilli were grown in media containing oleic acid in concentrations inhibitory to small inocula. Filtrates of these media, obtained after growth, then supported initiation of growth by small inocula. The improvement in the filtrates is due to removal of fatty acid by tubercle bacilli. This absorption of fatty acid is suggested as the major cause of the usual difference in behavior of large and small inocula of tubercle bacilli in synthetic media.

No evidence was found that growing tubercle bacilli contribute a growth factor to the medium.

ACKNOWLEDGMENT

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ADDENDUM

The various "Tween"-albumin media (*1*, *2*, *3*), including the medium used in this paper, are very useful in experimental work in which dispersed growth is desirable. These media are not particularly suitable, however, for the diagnostic cultivation which is of chief concern in public health laboratories. A selective diagnostic medium will be described in a later publication by Dubos.

(*1*) Dubos, R. J.: Rapid and submerged growth of mycobacteria in liquid media. Proc. Soc. Exper. Biol. and Med., **58**: 361 (1945).
(*2*) Dubos, R. J., and Davis, B. D.: Factors affecting the growth of tubercle bacilli in liquid media. J. Exper. Med., **83**: 409 (1946).
(*3*) Dubos, R. J., Davis, B. D., Middlebrook, G., and Pierce, C.: The effect of water-soluble lipids on the growth and biological properties of tubercle bacilli. Am. Rev. Tuberc. **54**: 204 (1946).
(*4*) Wells, H. G., and Long, E. R.: The chemistry of tuberculosis. Williams and Wilkins, 1932, Ch. 1.
(*5*) Lodge, R. M., and Hinshelwood, C. N.: Physicochemical aspects of bacterial growth. Part IX. The lag phase of *Bact. lactis aerogenes*. J. Chem. Soc., p. 213 (1943).
(*6*) Taylor, H. E.: Ph. D. thesis, Columbia Univ., N. Y. (1945).
(*7*) Drea, W. F.: Growth of small numbers of tubercle bacilli, H37, in Long's liquid synthetic medium and some interfering factors. J. Bact., **44**: 149 (1942).
(*8*) Davis, B. D., and Dubos, R. J.: The binding of fatty acids by serum albumin, a protective growth factor in bacteriological media. J. Exper. Med., **86**: 215 (1947).
(*9*) Davis, B. D., and Dubos, R. J.: The inhibitory effect of lipase on bacterial growth in media containing fatty acid esters. J. Bact., **55**: 11 (1948).
(*10*) Davis, B. D.: The estimation of small amounts of fatty acid in the presence of polyoxyethylene sorbitan partial fatty acid esters ("Tween") and of serum proteins. Arch. Biochem., **15**: 351 (1947).
(*11*) Davis, B. D.: The preparation and stability of fatty acid-free polyoxyethylene sorbitan monooleate ("Tween" 80). Arch. Biochem., **15**: 359 (1947).
(*12*) Dubos, R. J.: The effect of lipids and serum albumin on bacterial growth. J. Exper. Med. **85**: 9 (1947).

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 13, 1948

Summary

Following declines during the past 5 weeks, a slight net increase in the incidence of influenza was reported for the current week. A total of 7,447 cases was reported, as compared with 7,429 last week and a 5-year (1943–47) median of 4,744. The increase is accounted for chiefly in reports of 7 South Atlantic and South Central States showing a combined increase of 927 cases as follows (last week's figures in parentheses): South Carolina 841 (804), Tennessee 192 (81), Alabama 399 (205), Arkansas 266 (249), Louisiana 100 (55), Oklahoma 249 (137), and Texas 3,694 (3,283). This increase is offset in part by a combined decline of 763 cases in Virginia, Arizona, Oregon, and California. The total for the year to date is 107,067, as compared with 62,582 for the same period last year, which latter figure is also the 5-year median for the period.

Currently, 25 cases of poliomyelitis were reported in 14 States (last week 22, corresponding week last year 40, 5-year median 33). The total for the year to date is 317, as compared with 579 for the corresponding period last year and a 5-year median of 373.

Two cases of smallpox were reported, 1 each in Kansas and Oklahoma. The total since the first of the year is 31, as compared with 40 for the same period last year and 94 for the 5-year median.

Figures above the median expectancies have been reported since the first of the year for the following named diseases (last year's corresponding figures followed by the 5-year medians in parentheses): Influenza 107,067 (62,582–62,582); dysentery, amebic, 594 (449–270); dysentery, undefined, 2,254 (2,219–1,099); infectious encephalitis 91 (67–85); measles 131,543 (48,981–122,429); Rocky Mountain spotted fever 6 (9–4); undulant fever 887 (1,007–854).

Deaths registered during the week in 93 large cities in theUnited States totaled 9,789, as compared with 9,788 last week, 10,310 and 9,267, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 9,622. The total for the 11 weeks ended March 13 is 113,293, as compared with 110,459 for the corresponding period last year. Infant deaths totaled 639, as compared with 671 last week and 663 for the 3-year median. The total to date is 7,726, as compared with 9,010 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 13, 1948, and comparison with corresponding week of 1947 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47
	Mar. 13, 1948	Mar. 8, 1947		Mar. 13, 1948	Mar. 8, 1947		Mar. 13, 1948	Mar. 8, 1947		Mar. 13, 1948	Mar. 8, 1947	
NEW ENGLAND												
Maine	1	3	0	1	------	------	4	223	23	0	0	0
New Hampshire	0	0	0	------	1	------	1	11	5	0	0	0
Vermont	1	0	0	------	25	------	------	267	121	0	0	1
Massachusetts	4	14	5	------	------	------	786	489	489	0	1	6
Rhode Island	0	0	0	1	------	17	2	232	38	0	0	1
Connecticut	0	1	1	8	1	3	58	883	443	5	1	4
MIDDLE ATLANTIC												
New York	8	9	14	[1] 29	[1] 3	[1] 4	2,090	314	1,941	8	7	29
New Jersey	4	3	2	3	7	9	1,227	342	1,417	2	0	10
Pennsylvania	11	11	11	([2])	[2] 4	[2] 3	1,057	572	1,323	7	5	26
EAST NORTH CENTRAL												
Ohio	8	13	10	4	5	8	1,107	927	450	0	3	16
Indiana	8	15	10	18	526	12	1,114	65	222	1	0	7
Illinois	5	5	7	10	12	12	2,606	49	887	6	6	16
Michigan [3]	5	5	5	11	5	5	1,873	108	630	3	0	12
Wisconsin	1	0	0	30	44	44	851	65	826	0	3	3
WEST NORTH CENTRAL												
Minnesota	2	10	5	------	------	------	261	57	45	0	0	2
Iowa	2	2	4	------	205	1	631	27	80	3	2	0
Missouri	13	2	4	7	239	6	189	7	365	2	1	9
North Dakota	0	3	2	------	2	2	38	1	3	1	1	1
South Dakota	0	2	3	------	------	0	11	15	82	0	0	0
Nebraska	1	0	2	19	82	4	127	10	85	0	2	1
Kansas	1	5	5	61	3,395	6	28	14	374	1	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	33	4	22	0	0	0
Maryland [3]	3	3	6	8	5	7	82	43	73	3	2	4
District of Columbia	0	1	0	------	2	2	175	18	72	0	0	2
Virginia	4	4	5	459	520	520	152	370	531	2	5	8
West Virginia	1	2	3	77	304	18	289	103	94	3	0	5
North Carolina	16	16	10	------	------	------	12	259	259	4	0	6
South Carolina	8	4	6	841	504	522	60	68	68	0	1	3
Georgia	2	2	6	9	650	67	35	262	262	0	0	3
Florida	6	11	3	12	32	10	146	12	81	1	2	3
EAST SOUTH CENTRAL												
Kentucky	12	5	4	4	4	12	100	4	95	0	0	9
Tennessee	6	10	7	192	70	70	247	112	246	3	0	11
Alabama	3	7	6	399	233	229	95	61	132	2	2	6
Mississippi [3]	5	6	8	30	------	------	111	------	------	2	2	6
WEST SOUTH CENTRAL												
Arkansas	1	2	4	266	952	128	208	176	128	0	2	4
Louisiana	0	9	5	100	18	18	95	59	206	4	0	6
Oklahoma	2	8	3	249	272	107	34	3	36	1	3	3
Texas	21	19	40	3,694	11,624	1,689	1,680	251	1,261	11	10	19
MOUNTAIN												
Montana	1	0	0	26	120	14	100	212	172	0	0	0
Idaho	9	0	1	12	125	3	61	5	36	1	0	0
Wyoming	0	1	0	------	33	14	43	24	27	1	0	0
Colorado	4	5	5	26	1,720	40	443	77	331	1	0	0
New Mexico	1	0	1	------	5	2	24	55	13	0	0	0
Arizona	4	1	1	264	86	122	60	33	47	0	0	1
Utah [3]	5	0	0	34	34	34	37	8	93	0	0	1
Nevada	0	0	0	------	------	------	2	3	3	0	0	0
PACIFIC												
Washington	0	9	8	18	77	4	231	35	180	0	4	6
Oregon	0	1	3	151	24	24	45	18	97	0	0	3
California	14	19	19	374	21	64	1,747	203	953	12	7	23
Total	203	248	261	7,447	21,991	4,744	20,408	7,156	21,511	90	72	284
10 weeks	2,215	2,972	2,972	107,067	62,582	62,582	131,543	48,981	122,429	867	834	2,548
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	8,573	10,538	11,570	150,625	95,557	95,557	166,489	71,868	148,553	1,649	1,806	5,000

[1] New York City only.
[2] Philadelphia only.
[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year

Telegraphic morbidity reports from State health officers for the week ended Mar. 13, 1948, and comparison with corresponding week of 1947 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47
	Mar. 13, 1948	Mar. 8, 1947		Mar. 13, 1948	Mar. 8, 1947		Mar. 13, 1948	Mar. 8, 1947		Mar. 13, 1948 [5]	Mar. 8, 1947	
NEW ENGLAND												
Maine	0	0	0	14	33	33	0	0	0	0	0	0
New Hampshire	0	0	0	6	3	5	0	0	0	0	0	0
Vermont	0	0	0	2	6	12	0	0	0	0	0	0
Massachusetts	0	0	1	149	119	376	0	0	0	3	3	2
Rhode Island	0	0	0	8	12	18	0	0	0	0	0	0
Connecticut	1	0	0	50	45	81	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	4	4	2	307	371	581	0	0	0	1	0	4
New Jersey	1	0	0	89	134	161	0	0	0	4	1	0
Pennsylvania	1	1	1	376	224	468	0	0	0	4	1	3
EAST NORTH CENTRAL												
Ohio	2	0	1	399	447	442	0	0	0	1	0	0
Indiana	2	0	0	72	160	152	0	0	1	1	4	3
Illinois	0	1	1	129	179	265	0	1	0	1	3	1
Michigan [3]	1	0	0	168	122	197	0	0	0	0	1	1
Wisconsin	0	2	0	62	95	319	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	47	79	87	0	0	0	0	0	0
Iowa	0	0	0	34	77	77	0	0	0	0	0	0
Missouri	0	0	0	55	29	100	0	1	0	1	1	1
North Dakota	0	0	0	7	8	16	0	0	0	0	0	0
South Dakota	0	0	0	10	15	17	0	0	0	0	0	0
Nebraska	0	0	0	24	25	40	0	0	0	0	0	0
Kansas	0	1	1	32	76	90	1	5	0	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	8	12	12	0	0	0	0	1	0
Maryland [3]	0	0	0	33	39	129	0	0	0	0	0	0
District of Columbia	0	0	0	9	9	36	0	0	0	0	0	0
Virginia	0	0	0	36	38	77	0	0	0	1	1	1
West Virginia	0	0	0	18	6	33	0	0	0	0	0	0
North Carolina	1	2	0	42	46	46	0	0	0	2	2	0
South Carolina	0	0	0	5	5	9	0	0	0	1	2	2
Georgia	0	0	0	28	17	17	0	1	0	2	2	2
Florida	0	2	0	9	11	7	0	0	0	0	1	1
EAST SOUTH CENTRAL												
Kentucky	0	1	0	25	56	57	0	0	0	1	3	0
Tennessee	0	0	0	36	55	55	0	0	0	0	0	1
Alabama	0	3	1	6	12	12	0	0	0	1	1	1
Mississippi [3]	0	1	1	3	9	11	0	0	0	0	1	2
WEST SOUTH CENTRAL												
Arkansas	0	2	0	3	6	6	0	1	1	0	0	1
Louisiana	0	4	1	3	4	10	0	0	0	6	1	1
Oklahoma	0	1	0	11	6	24	1	0	0	1	2	1
Texas	3	3	4	39	60	76	0	0	1	1	6	3
MOUNTAIN												
Montana	1	0	0	17	5	13	0	0	0	0	1	0
Idaho	2	0	0	6	9	9	0	0	0	1	0	0
Wyoming	0	0	0	------	13	33	0	0	0	0	0	0
Colorado	0	0	0	19	64	53	0	0	0	1	0	1
New Mexico	1	1	0	10	5	5	0	0	0	0	0	0
Arizona	1	0	0	6	3	18	0	0	0	0	0	0
Utah [3]	0	1	0	17	13	64	0	0	0	0	0	0
Nevada	0	0	0	------	7	4	0	0	0	0	0	0
PACIFIC												
Washington	0	0	1	72	60	60	0	0	0	1	0	0
Oregon	0	0	0	24	34	34	0	0	0	0	0	1
California	4	10	7	66	145	213	0	0	0	4	6	6
Total	25	40	33	2,591	3,008	4,171	2	9	9	40	44	46
10 weeks	317	579	373	23,302	26,745	38,235	31	40	94	[5] 432	437	518
Seasonal low week [4]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	10,528	25,376	13,780	45,841	53,431	76,556	52	94	177	[5] 3,841	3,965	5,144

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 2 (salmonella infection), New York 1, Virginia 1, South Carolina 1, California 1. Delayed report of 50 cases in Oklahoma included in cumulative totals only.

Telegraphic morbidity reports from State health officers for the week ended Mar. 13, 1948, and comparison with corresponding week of 1947 and 5-year median—Con.

Division and State	Whooping cough			Week ended Mar. 13, 1948							
	Week ended—		Median, 1943–47	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Mar. 13, 1948	Mar. 8, 1947		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	14	16	24								2
New Hampshire	12	2	1								
Vermont	69	19	31								
Massachusetts	65	117	134		1		1		1		1
Rhode Island	15	12	38								
Connecticut	15	48	49								1
MIDDLE ATLANTIC											
New York	110	196	220	9	1			1			1
New Jersey	77	130	130	1							2
Pennsylvania	114	180	141								7
EAST NORTH CENTRAL											
Ohio	93	162	125	2							2
Indiana	27	42	19				1				
Illinois	67	90	90	3	1		1				16
Michigan [3]	71	232	147	1							9
Wisconsin	76	143	75				1				7
WEST NORTH CENTRAL											
Minnesota	28	12	12	1							1
Iowa	13	26	10				3				13
Missouri	17	24	14								1
North Dakota	15			4							
South Dakota	1		1								4
Nebraska		41	14								4
Kansas	31	5	35								1
SOUTH ATLANTIC											
Delaware		10	2								
Maryland [3]	16	65	41			2					4
District of Columbia	4	2	3	1							
Virginia	45	63	63			61					2
West Virginia	23	27	31								2
North Carolina	96	93	95	2					3		
South Carolina	97	27	58	1	6		1		1	1	
Georgia	8	12	12							1	1
Florida	16	54	18	2	1					2	2
EAST SOUTH CENTRAL											
Kentucky	21	39	32								2
Tennessee	41	27	36	2		2	1		4		1
Alabama	20	50	37								
Mississippi [3]	5			2					1		2
WEST SOUTH CENTRAL											
Arkansas	47	26	26	13		5			2		
Louisiana	3	4	4	4					2		1
Oklahoma	50	5	5	1							3
Texas	484	376	313	11	147	39				9	9
MOUNTAIN											
Montana	8	8	5								
Idaho		4	4				1				1
Wyoming	5	4	4								
Colorado	41	18	25								9
New Mexico	18	9	9	1							
Arizona	96	25	21			21					1
Utah [3]	16	11	26								2
Nevada	4	5	1								
PACIFIC											
Washington	31	39	35	1							1
Oregon	12	2	9								1
California	117	133	133	1			1			1	1
Total	2,254	2,635	2,614	63	157	130	11	1	14	14	117
Same week: 1947	2,635			48	233	375	5	3	27	38	86
Median, 1943–47	2,614			37	287	81	11	0	21	36	[4] 86
10 weeks: 1948	22,390			594	2,561	2,254	91	6	200	150	887
1947	25,028			449	3,461	2,219	67	9	417	460	1,007
Median, 1943–47	23,430			270	2,920	1,099	85	4	208	500	[4] 854

[3] Period ended earlier than Saturday. [4] 3-year median, 1945–47.

Territory of Hawaii: Rabies 0, bacillary dysentery 2, influenza 1, measles 2, scarlet fever 1, whooping cough 10.

WEEKLY REPORTS FROM CITIES*

City reports for week ended March 6, 1948

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	-------	0	1	0	4	0	0	2
New Hampshire:												
Concord	0	0	------	0	-------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	-------	0	0	0	0	0	0	------
Massachusetts:												
Boston	7	0	------	1	437	1	10	0	38	0	0	10
Fall River	0	0	------	1	1	0	0	0	2	0	0	1
Springfield	0	0	------	0	1	0	0	0	1	0	0	------
Worcester	0	0	------	0	-------	0	7	0	11	0	1	2
Rhode Island:												
Providence	0	0	------	0	1	0	3	0	6	0	0	------
Connecticut:												
Bridgeport	0	0	------	0	1	0	0	0	1	0	0	------
Hartford	0	0	------	0	-------	0	0	0	4	0	0	1
New Haven	0	0	------	0	1	1	0	0	4	0	0	5
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	7	1	7	0	6	0	0	12
New York	10	3	23	2	1,292	3	90	0	77	0	0	33
Rochester	0	0	------	0	-------	0	8	0	8	0	0	1
Syracuse	0	0	------	0	27	0	0	0	1	0	0	5
New Jersey:												
Camden	1	0	------	0	17	0	0	0	2	0	0	1
Newark	0	0	1	0	71	1	2	0	10	0	0	3
Trenton	1	0	------	0	1	0	5	0	0	0	0	------
Pennsylvania:												
Philadelphia	2	0	4	1	278	1	15	0	48	0	0	26
Pittsburgh	0	0	1	1	1	3	14	0	20	0	0	9
Reading	0	0	------	0	14	0	1	0	11	0	0	6
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	0	33	0	4	0	10	0	0	14
Cleveland	0	0	------	1	5	0	7	0	29	0	1	16
Columbus	3	0	------	0	134	0	3	0	6	0	0	------
Indiana:												
Fort Wayne	0	0	------	0	12	0	0	0	11	0	0	------
Indianapolis	1	0	------	0	143	0	2	0	11	0	0	1
South Bend	0	0	------	0	-------	0	0	0	1	0	0	------
Terre Haute	0	0	------	0	13	0	0	0	1	0	0	------
Illinois:												
Chicago	1	0	------	2	720	1	28	0	50	0	2	20
Springfield	0	0	------	0	308	0	1		0	0	0	2
Michigan:												
Detroit	1	0	1	0	193	0	10	0	69	0	0	15
Flint	0	0	------	0	2	0	2	0	3	0	0	------
Grand Rapids	0	0	------	0	390	0	3	0	1	0	0	5
Wisconsin:												
Kenosha	0	0	------	0	118	0	0	0	1	0	0	1
Milwaukee	0	0	------	0	51	0	3	0	14	0	0	6
Racine	0	0	------	0	192	0	0	0	4	0	0	3
Superior	0	0	------	0	24	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	41	0	2	0	5	0	0	3
Minneapolis	1	0	------	3	81	1	7	1	10	0	0	3
St. Paul	0	0	------	0	50	0	3	0	5	0	0	1
Missouri:												
Kansas City	0	0	5	0	6	0	8	0	2	0	0	24
St. Joseph	0	0	------	0	-------	0	0	0	0	0	0	------
St. Louis	1	0	2	0	123	1	7	0	17	0	0	20

* In some instances the figures include nonresident cases.

City reports for week ended Mar. 6, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	------	0	3	0	0	0	4	0	0	------
Nebraska:												
Omaha	0	0	------	1	20	0	3	0	0	0	0	1
Kansas:												
Topeka	0	0	------	0	------	0	0	0	1	0	0	3
Wichita	0	0	------	0	1	0	2	0	1	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	25	0	3	0	5	0	0	1
Maryland:												
Baltimore	1	0	2	0	14	0	7	0	12	0	0	15
Cumberland	1	0	------	0	------	0	0	0	0	0	0	1
Frederick	1	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	159	0	4	0	9	0	1	10
Virginia:												
Richmond	1	1	------	0	1	0	2	0	9	0	0	4
Roanoke	0	0	------	0	1	0	0	0	0	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	2	0	0	0	0	1
Wheeling	0	0	------	0	4	0	0	0	1	0	0	------
North Carolina:												
Raleigh	0	0	------	0	------	0	0	0	0	0	1	5
Wilmington	1	0	------	0	------	0	1	0	1	0	0	------
Winston-Salem	0	0	------	0	------	0	1	0	0	0	0	------
South Carolina:												
Charleston	1	0	45	1	------	0	0	0	2	0	0	3
Georgia:												
Atlanta	0	0	3	0	2	0	2	0	9	0	0	1
Brunswick	0	0	------	0	------	0	0	0	0	0	0	2
Savannah	0	0	------	0	------	0	0	0	0	0	0	2
Florida:												
Tampa	0	0	------	0	24	0	2	0	2	0	0	------
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	4	1	127	1	6	0	2	0	0	2
Nashville	0	0	------	0	------	0	3	0	1	0	0	------
Alabama:												
Birmingham	0	0	3	1	4	0	4	1	1	0	0	1
Mobile	0	0	49	0	------	1	2	0	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	4	0	7	0	2	0	0	0	0	------
Louisiana:												
New Orleans	0	0	34	2	5	1	10	0	0	0	1	2
Shreveport	0	0	------	0	------	0	3	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	16	0	2	0	6	0	2	0	1	2
Texas:												
Dallas	3	0	------	1	57	0	4	0	3	0	0	1
Galveston	0	0	------	0	------	0	2	0	1	0	0	------
Houston	1	0	------	0	4	0	9	0	1	0	0	------
San Antonio	1	0	------	0	7	0	9	0	3	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	0	0	0	0	0	2
Great Falls	0	0	------	0	5	0	1	0	0	0	0	------
Helena	0	0	------	0	------	0	0	0	0	0	0	------
Missoula	0	0	------	0	------	0	0	0	0	0	0	------
Colorado:												
Denver	0	0	4	0	262	0	2	0	3	0	0	15
Pueblo	0	0	------	0	8	0	1	0	6	0	0	10
Utah:												
Salt Lake City	1	0	------	0	11	0	1	3	4	0	0	------

City reports for week ended Mar. 6, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	1	12	1	9	0	16	0	0	5
Spokane	0	0	1	0	0	0	4	0	1	0	0	------
Tacoma	0	0	------	0	52	0	0	0	1	0	0	------
California:												
Los Angeles	3	0	21	2	140	1	10	0	28	0	0	14
Sacramento	0	0	------	0	1	0	1	0	7	0	0	------
San Francisco	0	0	36	0	218	0	7	0	4	0	0	2
Total	44	4	260	22	5,966	19	378	5	644	0	8	360
Corresponding week, 1947 [1]	83	------	247	26	1,483	------	411	------	792	0	24	659
Average 1943–47 [1]	72	------	207	[2] 29	[3] 5,168	------	[2] 443	------	1,508	1	10	625

[1] Exclusive of Oklahoma City.
[2] 3-year average, 1945–47.
[3] 5-year median, 1943–47.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (latest available estimated population, 34,566,200)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	18.3	0.0	0.0	5.2	1,155	5.2	54.9	0.0	186	0.0	2.6	55
Middle Atlantic	6.5	1.4	13.4	1.9	791	4.2	65.7	0.0	85	0.0	0.0	44
East North Central	3.6	0.0	1.2	1.8	1,422	0.6	38.3	0.0	128	0.0	1.8	50
West North Central	4.0	0.0	13.9	8.0	647	4.0	63.7	2.0	90	0.0	0.0	115
South Atlantic	9.9	1.7	82.7	1.7	381	0.0	39.7	0.0	83	0.0	3.3	74
East South Central	0.0	0.0	330.5	11.8	773	11.8	88.5	5.9	24	0.0	0.0	18
West South Central	12.7	0.0	137.2	7.6	208	2.5	114.3	0.0	25	0.0	5.1	15
Mountain	8.3	0.0	33.0	0.0	2,371	0.0	41.3	24.8	107	0.0	0.0	223
Pacific	4.7	0.0	91.7	4.7	669	3.2	49.0	0.0	90	0.0	0.0	33
Total	6.7	0.6	39.3	3.3	902	2.9	57.2	0.8	97	0.0	1.2	54

Dysentery, amebic.—Cases: New York 2; Philadelphia 1; Chicago 2; Baltimore 1; Brunswick 1; New Orleans 2; Oklahoma City 1; Los Angeles 4.
Dysentery, bacillary.—Cases: Worcester 1.
Dysentery, unspecified.—Cases: San Antonio 3.
Tularemia.—Cases: Memphis 1; New Orleans 1.

DEATHS DURING WEEK ENDED MARCH 6, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 6, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	9,788	10,206
Median for 3 prior years	9,885	------
Total deaths, first 10 weeks of year	103,504	100,149
Deaths under 1 year of age	671	856
Median for 3 prior years	607	------
Deaths under 1 year of age, first 10 weeks of year	7,087	8,233
Data from industrial insurance companies:		
Policies in force	71,199,020	67,329,750
Number of death claims	15,519	12,818
Death claims per 1,000 policies in force, annual rate	11.4	9.9
Death claims per 1,000 policies, first 10 weeks of year, annual rate	10.1	9.8

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 21, 1948.—During the week ended February 21, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows :

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		41	1	164	432	57	23	51	83	852
Diphtheria				26	1			6	4	37
Dysentery, amebic				3						3
Encephalitis, infectious				1						1
German measles				20	34		1	13	14	82
Influenza		105			47	3			71	226
Measles		1		1,097	1,310	5	9	28	126	2,576
Meningitis, meningococcus				2	1		1		2	6
Mumps		18	3	318	223	56	31	32	25	706
Scarlet fever		3		47	92	3	2	6	4	157
Tuberculosis (all forms)		3	4	81	29	25	19	7	75	243
Typhoid and paratyphoid fever				8						8
Undulant fever				3	2				1	6
Venereal diseases:										
Gonorrhea		14	6	114	59	26	23	35	71	348
Syphilis	1	4	4	56	48	14	7	7	22	163
Whooping cough		2	1	36	23	6	7	32	5	112

Jamaica

Notifiable diseases—4 weeks ended February 28, 1948.—During the 4 weeks ended February 28, 1948, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	4	12	Puerperal sepsis		1
Diphtheria	4		Tuberculosis, pulmonary	61	63
Dysentery, unspecified	1		Typhoid fever	8	73
Erysipelas	2				

SWITZERLAND

Notifiable diseases—October–December 1947.—During the months of October, November, and December 1947, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	October	November	December	Disease	October	November	December
Cerebrospinal meningitis	6	7	3	Mumps	73	88	190
Chickenpox	177	283	585	Paratyphoid fever	6	13	4
Diphtheria	665	643	663	Poliomyelitis	94	31	17
Dysentery, epidemic	16	17	92	Scarlet fever	786	591	556
Encephalitis, lethargic	1	-------	-------	Tuberculosis	357	279	334
Hepatitis, epidemic	53	52	51	Typhoid fever	9	7	4
Influenza	65	76	118	Undulant fever	14	6	14
Malaria	-------	1	-------	Whooping cough	333	329	289
Measles	403	351	490				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Smallpox

Burma—Rangoon.—For the week ended February 28, 1948, 45 cases of smallpox were reported in Rangoon, Burma.

China—Shanghai.—For the week ended February 28, 1948, 165 cases of smallpox were reported in Shanghai, China.

India—Calcutta.—For the week ended February 28, 1948, 414 cases of smallpox were reported in Calcutta, India.

Indochina (French)—Cochinchina—Saigon.—For the week ended February 28, 1948, 12 cases of smallpox were reported in Saigon, Cochinchina, French Indochina.

Korea.—For the week ended September 6, 1947, 1 case of smallpox was reported in southern Korea, and for the week ended September 13, 1947, 1 case was reported in Seoul, Korea.

Typhus Fever

Korea.—Typhus fever has been reported in southern Korea as follows: Week ended September 6, 1947, 2 cases were reported in southern Korea; week ended September 13, 1947, 4 cases, including 2 cases in Seoul, were reported.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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